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DETERMINATION OF GAS-DEPOSIT PARAMETERS FROM WELL-TEST DATA IN USSR

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Studies (1-5) on the full exploitation of gas deposits have up to now involved the solution of so-called direct problems, in which changes in liquid and gas reserves and pressure during exploitation are predicted from data on the deposit's productive area, or on the size and water-pressure system and on the effective width, porosity, and permeability. Practical methods for solving these direct problems are difficult to apply, however, because of the lack of reliable data on the average values of gas-deposit parameters.

Thus, beside laboratory core samples and other geological and geophysical data necessary for complete study of gas collectors, methods of gas dynamics should be developed to determine deposit parameters. These methods could supplement core sample data on local values of the deposit's porosity, permeability, and effective width.

The first phase of nonstationary gas filtration (3, 6) should determine deposit parameters. In this case, the problem can be considered plano-radial (for hydrodynamically perfect wells); the "radius of depression funnel" (or distances R_k to the specific source contour is easily found from conditions of mass balance, while boundary conditions are necessary given by the proper well tests.

Gas-well tests, where well pressure P_w is constant, measure the time variation in the well reserves $Q(t)$ and gas output $Q_o(t)$, related thus

$$Q(t) = \frac{\beta}{\ln R_K} \frac{kb}{\mu} \quad (1)$$

and
$$Q_o(t) = \int_0^t Q(t)\,dt = 2\pi R_\omega b m P_K (R_K^2 - 1)(1 - \xi), \quad (2)$$

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where $B = 2\pi/P_{am}(P_k^2 - P_w^2)$; $R_k^* = R_k/R_w$; $\xi = \tilde{P}/P_k$; k is the deposit's permeability; b is its effective width; μ is the absolute viscosity of the gas; P_{am}, $\tilde{P}$, and P_k are, respectively, atmospheric pressure, deposit pressure (averaged over volume, and pressure at the supply contour; R_w is well radius; m is porosity (3, 4, 6).

To determine the conductivity parameter kb/μ from carrottage diagrams and approximate data on the porosity n, we must estimate the product bm.

Further, from (2) we find R_k^* for data on $\varepsilon = P_w/P_k$; the quantity $\xi = \xi$ (R_k^*, ε) in (2) is determined from a graph or the formula:

$$\xi = 1 - \frac{1-\varepsilon^2}{2}\left(1/2 \cdot \ln R_k^* - 1/R_k^{*2} - 1\right) \qquad (3)$$

Knowing R_k^* and Q for a particular moment, we can determine average kb/μ's for different R_k's from (1).

We made special tests on gas wells to determine deposit parameters, the well pressure being held constant by pressure regulators.

Processing the test data by the above-described method, we found a set of values for kb/μ. Comparison of this set with that of kb/μ determined from prolonged exploitation data showed only a small 7-9% divergence, which obviously verifies satisfactorily our method for determining the conductivity parameter kb/μ for hydrodynamically perfect wells from data obtained by testing wells for constant well pressure.

Determination of the parameter bm from test data on wells is still an unsolved problem. Studies should be continued in this field and attention should be given to the possible employment of data giving the increase of pressure in a well, after being capped, to find bm.

BIBLIOGRAPHY

1. L. S. Leybenzon, Mechanics of the Oil Industry, II, Moscow, 1934.

2. L. S. Leybenzon, Movement of Natural Gases and Fluids in Porous Media, Moscow, 1947.

3. B. B. Lapuk, Theoretical Principles Governing the Exploitation of Natural-Gas Deposits, Moscow-Leningrad, 1948.

4. V. N. Shchelkachev and B. B. Lapuk, Subterranean Hydraulics, Moscow-Leningrad, 1949.

5. B. B. Lapuk, Doklady Akademii Nauk SSSR, 73, No 4, 1950.

6. V. A. Yevdokimova, Doklady Akademii Nauk SSSR, 73, No 1, 1950.

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